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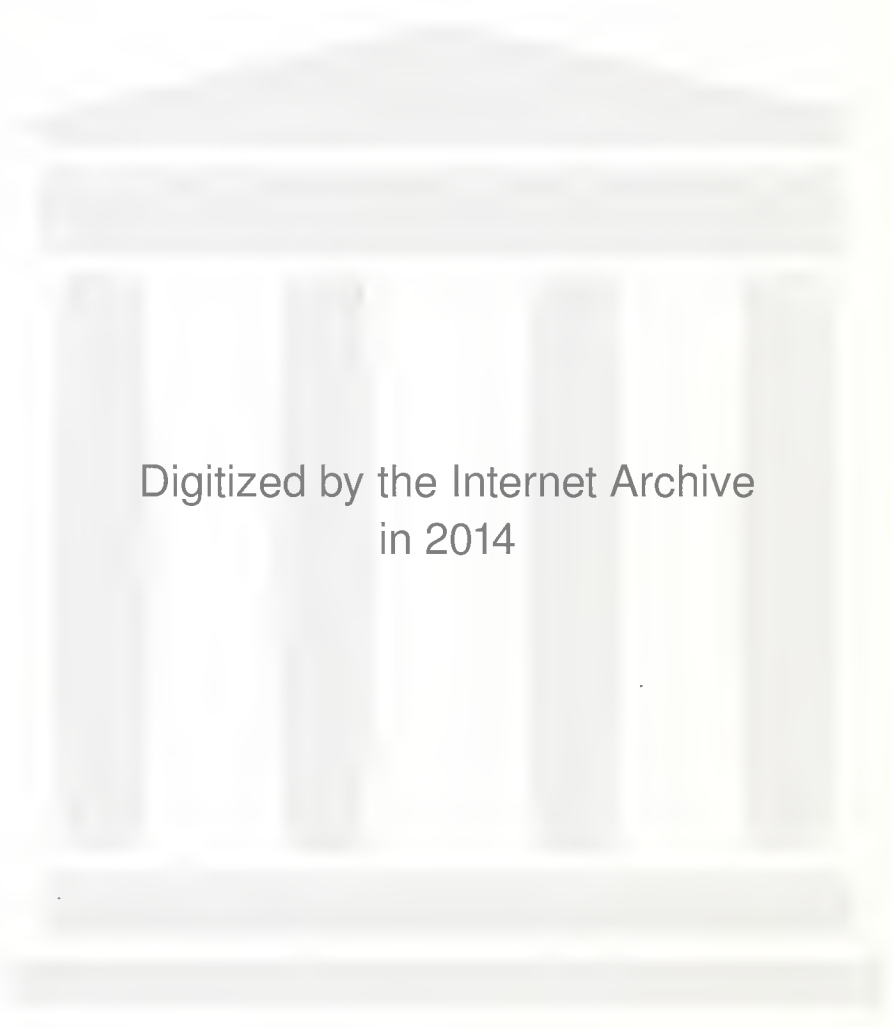
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The Arguments For and Against Train-Crew Legislation

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PREFATORY NOTE.

In 1913 the Bureau of Railway Economics issued Bulletin No. 53, entitled "The Arguments for and against Train-crew Legislation." There has been a large demand for this bulletin, and as such legislation continues to be sought by the Brotherhood of Railroad Trainmen and to be opposed by the railways and other interests, it seems desirable to revise the bulletin and bring the information in it up to date.

Following the defeat of the train-crew law in Missouri by a referendum vote of the people, referred to on page 40, the Brotherhood has been advocating in some States train-limit bills as substitutes for train-crew bills. Instead of prescribing the minimum number of men that shall be employed on trains containing specified numbers of cars, these new bills, by one kind of provision or another, fix the maximum length of trains. In some cases they provide that freight trains shall not contain more than 50 cars; in other cases, that freight trains shall not be more than a half mile in length, and so on.

Practically all of the arguments which have been advanced against train-crew legislation apply with equal or greater force to train-limit legislation. There are also strong arguments against train-limit legislation which do not apply to train-crew legislation. Among the effects which it is obvious would be produced by train-limit legislation are the following:

1. It has been chiefly for the purpose of enabling them to haul longer and heavier trains that the railways have made large expenditures to reduce the grades and curvatures in their main track, and to build long passing tracks and yard tracks. The investment for these purposes is now irretrievably made and the fixed charges on it must be paid, while legislation limiting the length of trains would prevent the reduction of operating expenses which the investment was made to obtain.

2. The various improvements which have been made in the appliances used on trains, and which are mentioned in the following pages, such as improvements in brakes, couplings, etc., have had the purpose and effect of enabling the railways to op-

erate long trains with crews containing a given number of men as safely and efficiently as they could formerly operate short trains with the same number of men. The advantages derived from these improvements would be greatly reduced if the number of cars handled in trains should be limited as proposed.

3. Great increases have been made in the tractive power of locomotives for the purpose of enabling the railways to haul longer trains. These increases in tractive power have been obtained at the expense of an increased cost per locomotive. Obviously, the increases in tractive power would become valueless if legislation compelled the hauling of trains lighter and shorter than the locomotives have been built to haul. Furthermore, legislation limiting the number of cars that could be hauled by each locomotive would make it necessary to buy and operate more locomotives, thus increasing both the fixed charges and the operating expenses of the railways.

4. Legislation which restricted the length of trains would make it necessary to increase the number of trains run in order to handle the business. This would compel the railways to employ more men of every class directly or indirectly concerned with train operation, whereas the train-crew legislation forces them to employ only extra brakemen. Therefore, the increase in expenditures for labor caused by such legislation would be much greater than that caused by train-crew legislation.

5. Train-limit legislation, like train-crew legislation, is being advocated nominally in the interest of safety. But, as has been shown, limitation of the length of trains would necessitate the running of more trains; and an increase in the number of trains run, without a corresponding increase in trackage and all other facilities, would, for obvious reasons, increase rather than decrease the hazards of operation. If, in order to prevent the increase in the number of trains from causing an increase in the number of collisions and other accidents, additional tracks, signals, and so on were provided, the result would necessarily be a further increase in investment, fixed charges and operating expenses.

It is clear, therefore, that the proposed train-limit legislation would tend to increase rather than reduce the hazards of railway operation, and that it would increase both fixed charges and operating expenses all along the line.

INTRODUCTION.

Within recent years, numerous bills to regulate the number of men that railways must employ in their train crews have been introduced in the State legislatures and in Congress. These measures are commonly known as "full-crew bills." They specify, sometimes the number of men that must be employed on passenger trains; sometimes the number of men that must be employed on freight trains; sometimes the number that must be employed in switching service, and sometimes the number that must be employed in all of these classes of service. Such measures have become laws in twenty States, namely, Arizona, Arkansas, California, Connecticut, Indiana, Maine, Maryland, Mississippi, Nebraska, Nevada, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Washington, and Wisconsin. In some cases they merely require the employment of the number of men that it is customary for the railways to employ, existing practice not being affected. In at least twelve States these laws compel the employment of additional men. Within the last six years, nine bills have been presented in Congress, each of which would have compelled the employment of more men; but no federal train-crew law has yet been enacted.

The first efforts to secure train-crew legislation date back a number of years, and these efforts have been continued with great energy and perseverance. For example, a bill was introduced in the Massachusetts Legislature in 1902 and defeated. It was again introduced in 1903 and 1904 and defeated in both years. It reappeared in 1908. On this occasion the legislature referred the whole matter to the State Railroad Commission for investigation. The commission, after inquiry, reported that if the officers of the railways would see that the provisions of the Standard Code of operating rules were enforced, and make some changes in methods locally, legislation would be unnecessary. The bill was again introduced in 1909 and defeated. It was again introduced in 1912, and this time was passed by both houses.

Governor Foss vetoed it; whereupon an unsuccessful attempt was made to pass it over his veto. Later, the Board of Railroad Commissioners issued several recommendations regarding the manning of trains, with which all the roads at once complied.

Both State and federal bills have been introduced from time to time at the instance of railway labor organizations, the chief promoter of such legislation being the Brotherhood of Railroad Trainmen. The legislative representatives of these organizations have repeatedly announced that their members would vote against law-makers who did not support the measures they demanded. Many members of the Brotherhood itself have not favored, or have been opposed to, the proposed legislation. But opposition on their part is now stopped by a resolution of the Brotherhood to the effect that its members cannot sign petitions against labor legislation, "nor interfere with the work of their legislative representatives, without violating the law of the Brotherhood, which would mean expulsion for the offending party."¹

The labor brotherhoods and the members of state legislatures and of Congress who have favored such legislation have advocated it chiefly on the ground that the employment of more men in train service is necessary to the safety of railway employees and passengers. Such legislation has been opposed by officers of the railways, by many commercial and agricultural organizations, and by many members of State legislatures and of Congress on the ground that it does not increase the efficiency or safety of railway operation or otherwise benefit the public, and hence that it does add unnecessarily to railway expenses. Therefore railway managers have in several cases urged State governors to veto such measures. In New York and Missouri the governors, notwithstanding earnest protests from railway officers, signed the bills as passed by the legislatures and issued statements indicating their belief that they would promote safety and were therefore in the public interest.² On the other hand, Governor Sulzer's two immediate predecessors, Governors Hughes and

¹ From "The Railroad Trainman," the official publication of the Brotherhood of Railroad Trainmen, for May, 1913, p. 465.

² In Missouri the railroads circulated a referendum petition, and secured enough signatures to have the measure submitted to a vote of the people. As shown elsewhere herein, the law was defeated by a majority of more than two to one by the voters at the election in November, 1914. See page 40.

Dix, vetoed train-crew bills that had been passed by the New York legislature. Governor Cruce of Oklahoma, Governor Foss of Massachusetts, and Governor Harmon of Ohio also have vetoed similar bills on the ground that general legislation requiring the railways to employ additional men on trains was undesirable. But in all except Massachusetts and Oklahoma subsequent enactments have been approved. A number of State legislatures have also refused to pass train-crew bills: among these are the legislatures of Colorado, Delaware, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Montana, New Hampshire, New Mexico, North Carolina, South Dakota, Tennessee, Utah, Virginia, West Virginia, and Wyoming.

In a movement concerning which there is such wide diversity of opinion it is desirable that there should be the fullest information as to the views both of those who advocate and of those who oppose such legislation. In the following pages there is presented the history and present status of train operation, out of which has grown the demand for "full-crew" legislation, the provisions of the measures enacted and proposed, the expense resulting from the legislation already passed as estimated by the railways, the estimated expense of proposed legislation, and a discussion of the effect of such legislation upon the efficiency and safety of transportation.

CHANGING CONDITIONS OF TRAIN OPERATION.

Until within a comparatively recent time trains were ordinarily made up at the point of origin by the same employees who subsequently handled them on the road. The trainmen switched the cars into place, coupled them, and did all the work necessary to prepare the train for its run, including the inspection of its condition before starting. Cars were coupled to each other and to the engine by the link and pin couplers. Brakemen had to carry links and pins to supply couplers lacking them, and to carry those unused back to the caboose or engine. Coupling was effected by hand, for which purpose the employees had to go between the cars. Trains were controlled entirely by hand-brakes, which had to be worked from the tops of freight cars and from the platforms of passenger cars. Practically all trains rendered local as well as through service—that is, they not only carried through traffic between large terminals, but also stopped at stations along the line to put off and take on goods or passengers. When a car was taken out of a train or taken into a train at one of these local stations, it was necessary to use the hand-brake in the switching needed to make the requisite changes. The work of trainmen at that time was hard and hazardous. The number of cars in a train was considerable. More than thirty years ago, before the introduction of air-brakes, it was the custom of many railways to handle regularly freight trains of forty cars or more with two brakemen. That is, the crew of a freight train, aside from employees on the engine, usually consisted of a conductor and two brakemen. The labor of controlling the train exposed the brakemen to all kinds of weather and involved strenuous physical exertion, for the application of hand-brakes sufficient to hold a train often required both strength and quickness of action. The brakemen had to spend most of their time on the tops of the cars, which in winter were often slippery with ice. Going between cars to couple by hand necessarily involved danger, so that accidents to trainmen were numerous. Passenger cars were heated by wood and coal stoves, which it was the brakemen's duty to take care of.

Development of Air-brakes and Automatic Couplers.

In 1868, the first successful application of air-brakes to passenger trains was made. In July, 1886, and in May, 1887, the Master Car Builders Association held a series of competitive trials, with the result that the air-brake was found to be as adaptable to freight trains as to passenger trains. Its use in freight service was thereafter rapidly extended.

The principle of the air-brake is simple. Cylinders under each car are filled with compressed air, which, when released, rushes into adjoining cylinders, where, through connecting mechanism, it forces brake-shoes upon the wheels, thus bringing the train to a stop. These cylinders are supplied with air by a continuous line of air-pipe and hose leading from the locomotive. Application of the brakes is thus effected by the engineer. Moreover, any disconnection of the train line at any place in its length, as when a train breaks in two, automatically applies the brakes. There are also "conductors' valves" in each passenger car, and in the caboose of each freight train, by means of which the brakes may be applied.

In 1887, the Master Car Builders Association, after several years of investigation, recommended a standard type of automatic coupler. In 1890 the type that had become known as the "Master Car Builders' Freight Coupler" was recognized as standard by the railroad companies of the United States through their official organization, the American Railway Association. In order, however, to compel the adoption of a standard type of coupler by all of the railways of the United States, federal legislation was enacted. In 1893 the Railway Safety Appliance Act was adopted. This law provided that after January 1, 1898, it should be unlawful for any common carrier to use in interstate commerce any car "not equipped with couplers coupling automatically by impact, and which can be uncoupled without the necessity of men going between the ends of the cars." It also provided that it should be unlawful for any carrier to use in interstate commerce any locomotive "not equipped with the power driving wheel brake, and appliances for operating the train-brake system, or to run any train in such traffic after said date that has

not a sufficient number of cars in it so equipped with power or train brakes that the engineer on the locomotive drawing such train can control its speed without requiring brakemen to use the common hand-brake for that purpose." The law was amended in 1903 to provide that at least 50 per cent of the cars in a train should be controlled by air-brakes applied from the engine, and the Interstate Commerce Commission was authorized from time to time, after full hearing, to "increase the minimum percentage of cars in any train required to be operated with power or train brakes which must have train brakes used and operated as aforesaid." The commission subsequently increased to 75 per cent the proportion of cars in a train on which power brakes must be operative, and on September 1, 1910, raised this minimum to 85 per cent.

In consequence of these requirements, the use of automatic couplers and train brakes has become practically universal in the United States. For the fiscal year ending June 30, 1912, 99.05 per cent of the locomotives and cars were fitted with train brakes and 99.67 per cent with automatic couplers. Today it is exceptional for a train to have any cars that are not equipped with air brakes.

These improvements in equipment have had a far-reaching effect upon the work of railway trainmen. The engineer of a train, whether passenger or freight, is now its real brakeman and, save under exceptional conditions, sets and releases the brakes from his cab on the engine. The "brakemen," so called, seldom have anything to do with the brakes except on detached cars during switching operations. Indeed, the term "brakeman" is now a misnomer and is being displaced in railway usage by the term "trainman." The general substitution of the automatic coupler for the old link and pin has changed the character of the trainman's work in coupling and uncoupling and has very greatly diminished the hazard. Indeed, railway managers claim that, if the trainmen comply with their instructions, the hazard is eliminated entirely. Formerly, when coupling cars, the brakeman had to stand between the cars at the moment of their coming together in order to guide the link into its place. This entailed great risk of having his hand crushed, as well as of being thrown down and run over. Now, any necessary adjustment of the coup-

ler can be made, and ought to be made, before the cars are put in motion to effect the coupling. Formerly, when uncoupling, the brakeman had to stand between the cars to remove the pin. Now, the pin that locks the coupling can be removed by a rod extending to the side of the car. Thus during neither the coupling nor the uncoupling does the trainman need to stand between the cars. These changes apply to both freight and passenger cars. How greatly they have reduced the hazard of coupling and uncoupling cars is indicated by the following table:

CASUALTIES TO TRAINMEN FROM COUPLING ACCIDENTS 1890 AND 1913.

Year.	Total number of trainmen.	Total killed.	Total injured.	Number killed for each 10,000 trainmen.	Number injured for each 10,000 trainmen.
1890.....	153,235	265	6,073	17	396
1913.....	339,600	184	3,293	5	97

In addition to the changes in their work directly resulting from the introduction of air-brakes and automatic couplers, there have been other modifications in the duties of trainmen which may be briefly noted. In the first place, the train crew as a rule no longer makes up and inspects the train at terminals. Switching crews now make up all trains at all important points of origin and, after they have been inspected by inspectors employed for that purpose, deliver them to the train crew ready for operation. The train crew has no more to do with the preparation for the run than to test the brakes. At the end of the run the train crew has only to deliver a train to the switching crews, which separate the cars for further disposition. It may also be noted that the work and responsibility of freight conductors en route has been lightened by the present practice whereunder a yard clerk furnishes them a statement of the cars in the train, with the respective destinations, from which the conductors check off each car as it is set out and to which they add other cars as they are picked up. Formerly, the conductors had to prepare these statements of the cars composing the trains.

Again, the trainman's duties on passenger trains are less arduous because passenger trains are now almost universally heated with steam or hot water from the engine, and the trainman has only to regulate the degree of heat. The gradual displacement of the oil lamp by gas and electric lighting has relieved the trainman of many former duties.

Increase in Trainloads.

Coincident with the development of safety appliances on trains, there has been a steady and rapid increase in the length and load, particularly of freight trains. Generally speaking, transportation is conducted most economically when traffic is handled in the largest units. The larger the loads per car and per train, the less the relative investment that must be made in roadway, track, and equipment, and the less the relative expenditures that must be made for maintenance of way and equipment, and for conducting transportation.

Faced with steadily increasing expenditures for wages, materials, and taxes, with revenues from the transportation of freight and passengers not increasing at nearly the same rate as expenses, the railways have found it necessary to practice economies in operation. The greatest economies have been secured by increasing the number of tons hauled per train, and by increasing the amount of traffic handled in proportion to the number of men employed. The extent to which, in their efforts to handle traffic economically, the railways of the United States have increased their trainloads is indicated by the fact that the average number of tons per train in this country in 1890 was 175; in 1900, 271, and in 1912, 407. In the region of heaviest traffic, that comprising in general the States of New York, Pennsylvania, New Jersey, Delaware, and Maryland, the average number of tons per train increased from 218 in 1890 to 502 in 1910. On some lines the average trainload exceeds 1,100 tons; trainloads of minerals ranging from 3,000 to 5,000 tons are not uncommon, and sometimes a train has as many as 6,000 tons. These heavy increases in trainloads have been effected very largely by increasing the capacity of cars and their loading, and by increasing the number of cars in a train. The average capacity of a freight car in this country increased from 28 tons in 1902 to 37 tons in 1912. Loaded freight trains often contain 50 to 75 cars, and trains containing even larger numbers of empty cars and exceeding a half mile in length are run not infrequently in some parts of the country.

There has been no such corresponding increase in the length of

passenger trains, although passenger trains on main lines are somewhat longer than they were in past years. Often 12 to 16 and even more cars are pulled by a single engine; the passenger cars have increased in size and especially in weight.

With this increase in car loading and train loading there has been a decrease in the number of men required to handle a given amount of traffic. It has not, however, been accompanied by a decrease in the total number of trainmen, for, as is shown later, their number increased from 1901 to 1912 at a greater rate than the car mileage or the train mileage.

TRAIN CREWS UNDER PRESENT CONDITIONS.

Passenger Service.

The number of men employed on passenger trains varies with conditions. On many local trains containing only two or three cars the crew behind the engine consists merely of the conductor, acting also as baggagemaster, and one man who serves as brakeman or flagman.

In the South many two-car trains are run with crews behind the engine consisting of a conductor, brakeman, and negro porter, the conductor or the brakeman acting as baggagemaster. Another combination in the South consists of a conductor, a messenger who takes care of both baggage and express, and a porter. In this case, the baggagemaster serves as flagman.

Throughout the country on trains of four or five cars, the crew customarily includes conductor, baggagemaster, brakeman or flagman, and frequently a porter; there are additional brakemen for trains with greater numbers of cars. The brakemen on passenger trains announce stations, help the passengers as they get on and off, set switches, load and unload baggage, look out for hot boxes and other defects, and flag. When there are both a porter and a flagman or a brakeman and a flagman, as is the case on most main-line passenger trains, the flagman's sole duty is to flag and to set switches behind the train.

The object of many of the legislative enactments affecting train crews in passenger service is to require the employment on every passenger train, whatever its length, in addition to the men on the engine, of at least a conductor, a baggagemaster, and a brakeman or flagman; and to require still other men on trains exceeding certain specified lengths. For example, a bill introduced in Congress in 1909 provided that the crew of a passenger train having three cars or less must include a conductor, a baggagemaster, and a brakeman. This would have made it necessary to add a baggagemaster on many short branch-line trains carrying at present only a conductor and a brakeman; and in many cases in the South either to add a brakeman or to substitute a brakeman for the porter. The same bill provided that the crew, on trains of three

cars or more, include at least a conductor, a baggagemaster, and two brakemen. This would have made necessary the employment of an additional man on many trains. The law in Nevada requires two brakemen on trains of three or more cars; the laws in New Jersey, Oregon, Pennsylvania, Washington, and Wisconsin, on trains of four or more cars; the law in Indiana, on trains of five or more cars, and the law in Nebraska, on trains of six or more cars. Under the New Jersey law there must be at least six trainmen on every train containing a baggage car in addition to four or more passenger cars, and under the New York law every train of five or more cars having a baggage car must have a baggageman in addition to the engineer, fireman, conductor, and two brakemen.

These laws prescribe the number of trainmen according to the number of cars in the train. But the necessity or occasion for having more rather than fewer trainmen is not necessarily determined by the number of cars. A great many trains carry Pullman cars, on which there are Pullman conductors and porters to assist passengers and to look after the heating and lighting and ventilation of their respective cars. In such cases, there is no need for as large a regular train crew as in the case of trains of the same length carrying no Pullmans. And yet the laws make no allowance for the service of the Pullman porters. Such laws appear especially illogical in the case of trains composed exclusively of Pullman cars.

Freight Service.

Modern freight trains are roughly divided into two classes—through freight trains and local freight trains. The broad distinction is that through trains ordinarily run from terminal to terminal with little or no work en route in picking up or setting out cars or in delivering or receiving freight at intermediate points, while local trains make numerous stops at intermediate local stations to receive and deliver freight, switching cars at such stations when necessary. The difference in the service not only expedites the movement of traffic, but is more economical from an operating standpoint.

On a through freight train there are usually five men—an engineer, fireman, conductor, and two brakemen—one of the brake-

men sometimes being called a "flagman." At the point of origin the train, made up and ready for its run, is delivered by a switching crew to the train crew. The place of one of the brakemen is on the engine; the other goes into the caboose with the conductor. The ordinary duties of the forward brakeman are to transmit signals from the conductor to the engineer and to open switches in front when it is necessary for the train to go on a siding at a meeting point. The ordinary duties of the rear brakeman are to flag at the rear end of the train when it stops and to close switches behind the train when it has gone on a siding. In an emergency caused, for example, by a draw-bar pulling out or the air-hose parting, the conductor may need the direct assistance of one of the brakemen. In that case the rules require the rear brakeman to flag the rear of the train and the fireman to flag the front of the train, while the forward brakeman assists the conductor. In these very rare cases, the fireman may be used to protect the front of the train, because at such times he is not performing any other duties. As already indicated, there is ordinarily a valve in the caboose by which, in case of emergency, the brakes can be set by any one who is in the caboose; or if anything goes wrong with the apparatus, the brakes on all cars are at once set automatically. Failures in the braking apparatus that cannot be promptly remedied on the spot are ordinarily due to something that has happened in or to the engine. In this case the train moves slowly and under control to the next station, where it is held until another engine is supplied.

In addition to the air-brakes, all freight cars are still equipped with hand-brakes. These hand-brakes are not worked by employees on through freight trains in the ordinary course. They are resorted to only in case the air-brakes fail, or under especial conditions, such as going down steep grades. When hand-brakes are used on such heavy grades as, for example, on some parts of the New York Central lines, it is the usual custom to employ three or more brakemen on through freight trains. On some roads under similar circumstances a mechanical device known as a "retainer" is used to supplement the air-brake, but even then where the grades are severe extra brakemen are usually employed. As a general rule, the duties of brakemen on through trains, between terminals in non-mountainous territory, are confined to

throwing switches, flagging, and assisting the conductor in examining the running gear. On arrival at the terminal, the signal lamps are put away and the caboose locked up by the train crew, and the train is turned over to the regular yard switching crew.

While it is the general custom to employ two brakemen on a through freight train, it is usual to employ three or more brakemen on a local freight train, notwithstanding that local trains have fewer cars. This is not to serve the need for safety, but to expedite the service. Local trains set out and pick up cars at way stations, and load and unload a great deal of less-than-carload freight. Hence there is much switching to be done and much handling of freight at way stations, and the additional brakemen are ordinarily necessary that the trains may not be unduly detained. Similarly, three brakemen are usually employed on a train switching cars to and from industrial tracks. It is only in these cases when cars are being switched that brakemen are obliged to go on the top of cars to operate hand-brakes. When a train is under way the third brakeman has no particular duties or station, but frequently rides in the caboose with the conductor and rear brakeman.

So far as freight-train service is concerned, the purpose of train-crew legislation usually is to require the railways to employ at least three brakemen on a through freight train. As has been said, it is standard practice to employ at least two brakemen on every through train and at least three brakemen on every local train. Following is a list of the States in which laws have been passed requiring three brakemen on trains and specifying the minimum number of cars to which this requirement shall apply: Arkansas and Washington, 25 cars or more; New York, 26 cars or more; Maryland, New Jersey, and Pennsylvania, 30 cars or more; Arizona and Oregon, 40 cars or more; California, Nevada, and Indiana, 50 cars or more; North Dakota, 46 or more cars. The bills that have been introduced in Congress usually have required three brakemen on every train containing 25 cars or more.

Here, again, it will be seen that the laws prescribe the number of trainmen on the basis of the number of cars in the train. From what has just been said of the character of the work to be done on through and local trains, it is evident that the number of cars in a train is not the logical basis for the determination of the size of the train crew.

EFFECTS OF TRAIN-CREW LEGISLATION.

Increase in Operating Expenses.

It is obvious that an increase in the number of men in a train crew means an increase in the operating expenses and, unless accompanied by a corresponding increase in the traffic per train or in rates, means a decrease in net operating revenues. The railways are reporting to the Special Committee on Relations of Railway Operation to Legislation careful estimates of the additional expense resulting from operating legislation already enacted. On January 26, 1915, the Committee made public the following compilation of replies received by it from 166 railways, operating 204,610 miles of line, regarding the expense caused them in the fiscal year ended June 30, 1914, by legislation, both Federal and State, affecting operation:

COST OF LEGISLATION³ AFFECTING RAILWAY OPERATION—SUMMARY OF REPLIES
OF 166 RAILWAYS, OPERATING 204,610 MILES.

COST OF COMPLIANCE.			
FEDERAL AND STATE LAWS.	Year ending June 30, 1914.	Total to June 30, 1914.	Amount necessary to complete (estimated).
Hours of service.....	\$5,013,345	.....	.....
Full (extra) crew.....	4,051,533	.....	.....
Boiler inspection.....	4,141,051	.....	.....
28-hour stock law.....	247,119	.....	.....
Semi-monthly pay-day ...	826,586	.....	.....
Safety appliance.....	\$5,965,926	\$23,845,436	\$19,588,408
Postal car requirements...	890,907	4,391,531	3,129,670
Ash pan	86,818	2,017,562	165,073
Headlight	1,002,840	2,635,294	624,966
Caboose	597,206	949,029	2,614,406
Jim Crow.....	29,623	659,380	1,468
Other enactments.....	2,785,850	12,852,649	96,684,127
Specific orders, State Com- missions	3,065,179	.....	.....
Total.....	\$28,703,983	\$47,350,881	\$122,808,118

	Number Killed.	Persons Injured.	Total.	Property Damage.
Collisions where third brakeman was employed, year ending June 30, 1914	30	641	702	\$411,228

It will be seen that the total expense caused by operating legislation in the fiscal year 1914 to the railways reporting was \$28,703,983. This would pay a return of 5 per cent on an investment of \$574,000,000. The total expense caused by the extra-crew laws was \$4,051,533. This would pay 5 per cent on an investment of over \$80,000,000. This estimate applies to the expense to the railroads on account of train-crew laws enacted in only a limited number of States. The full effect can be seen only from estimates that apply on account of all such laws to all the railways in the United States. Four train-crew bills were introduced in Congress in 1909 and 1910. The Special Committee on Relations of Railway Operation to Legislation made inquiries early in 1910 of all the railways as to the cost to them of complying with these Federal bills, if enacted, as well as the expense they were being put to on account of State legislation then in force in 13 States. The following table is a summary of the replies received:

ESTIMATE OF 1910.	Number.	Mileage.	Amount of additional annual cost of compliance with full-crew bill.
Roads replying.....	166	205,547	\$18,328,302.32
Estimated for other roads exclusive of Canadian and Mexican roads.....	126	23,254	1,953,336.00
Total.....	292	228,801	\$20,281,638.32

Another bill was introduced in Congress in 1912 which required that on each freight train containing 25 or more cars the crew should consist of at least an engineer, a fireman, a conductor, and three brakemen, "regardless of any modern equipment of automatic couplers and air-brakes." This bill made no reference to passenger-train crews. As a result of inquiries made of the railways by the Special Committee on Relations of Railway Operation to Legislation, in connection with this proposed Federal law, the following compilation was made from the replies received from 143 operating companies:

ESTIMATES OF COST, IN 1912, OF TRAIN-CREW LAWS FURNISHED BY 143
OPERATING COMPANIES OPERATING 195,049 MILES.

Trains affected by State laws then in effect, per annum.....	678,661 <i>a</i>
Additional trains affected by proposed Federal law in States then having full-crew law, per annum.....	468,483
Trains affected by proposed law in States then having no full-crew law, per annum.....	3,211,056
Total trains affected by State laws and proposed Federal statute, per annum.....	4,358,200
Cost of compliance with State laws then in effect, per annum..	\$1,797,589.94 <i>a</i>
Additional cost of compliance with proposed law in States then having full-crew law, per annum.....	1,342,237.17
Cost of compliance with proposed law in States then having no full-crew law, per annum.....	10,255,790.66
Total cost per annum of compliance with State laws and proposed statute.....	\$13,395,617.77

a Does not include States where laws were passed subsequent to 1911.

It should not be overlooked that this expense is only a part of the total increase in operating expenses that has been caused by legislative requirements imposed upon railroad operation. Such further legislation includes laws requiring 8-wheel cabooses in place of 4-wheel cabooses, laws limiting the hours of service, requiring electric headlights, requiring the installation of improved safety appliances, regulating the stops of passenger trains, the speed of stock and freight trains, requiring the abolition of grade crossings, or the installation of additional watchmen at crossings, requiring double track, and providing for days off at the company's expense. Quite independent of the question of the defensibility of these laws is the fact that they add greatly to the expense of railway operation, which must eventually find expression in higher charges to the public than would otherwise be made.

However, the fact that such train-crew legislation increases operating expenses is not a conclusive argument against it. The legislation, presumably, is intended to promote the interest of the public, and the question at issue is whether there are benefits directly or indirectly conferred on the public, and, if so, are they commensurate with the expense incurred.

ISSUES INVOLVED IN TRAIN-CREW LEGISLATION.

In order that the arguments in favor of train-crew legislation may be fairly presented, it is desirable to give the fullest consideration to any statement from an authoritative source. To this end a thorough search has been made throughout the existing body of railway literature, throughout the reports of hearings before Committees of Congress and State legislatures, and throughout recent issues of *The Railroad Trainman*, the official organ of the Brotherhood of Railroad Trainmen. An effort was made to secure reports of hearings before State legislatures also, but without success, except in the cases of Kansas and Virginia. All the arguments containing definite statements why extra crew legislation should be enacted can be found in a statement by W. G. Lee, President of the Brotherhood of Railroad Trainmen, quoted in the *Metropolitan Magazine* for June, 1913, and in a statement made by A. A. Roe, who represented the Brotherhood of Railroad Trainmen at a hearing held in 1911 by a committee of the Kansas legislature.

Mr. Lee's statement is as follows:

"The necessity for such legislation arose out of the practice of the railway companies reducing the number of men to an extent considered unsafe by the employees. Some years ago certain railways reduced the number of freight trainmen to one, whose duty was to flag, leaving the work of running and looking after the train to the conductor.

"Further necessity (for such legislation) arose through increased tonnage and fewer men employed, which was made possible through safety appliances and heavier equipment. The railways assumed the position that as trainmen no longer had to control trains by hand-brakes they were unnecessary. The heavier demands that increased tonnage placed upon trainmen in other ways were not considered. On the majority of our railways freight trains are composed of from 50 to 100 cars—they are from half a mile to a mile in length. Such trains must be carefully inspected at water tanks and other stops. They require extra care in handling, particularly in crossing over to permit superior class trains to pass. If switching is to be done, and less than three men are employed, it leaves this work to be done by one man under conditions most dangerous to himself and the traveling public, particularly when the work is done at night.

"Railway companies have forced men to work under unsafe conditions, with the result that hundreds are disabled or killed every year. Our Brotherhood paid one claim for every sixty-seven members in the year 1912, which is evidence that train service is most hazardous.

"The statement is made that extra men have not prevented wrecks. No one can speak advisedly on this subject. Wrecks that are prevented do not figure in the statistics.

"Railway managers rest their case on the statement that full-crew legislation will not prevent wrecks. Employees, speaking from daily experience, contend that it will make wrecks less frequent than they otherwise would be, and that it will increase the personal safety of employees and of the public. Managers argue that such legislation would put an unnecessary cost on the public. Employees point to the fact that every six minutes, day and night, year after year, one of their number is killed or injured. In the name of humanity they ask from the State the protection denied them by the companies."

This statement by the official head of the trainmen's organization appears to contain two definite points: 1. The adoption of safety appliances and the increase in trainload has resulted in a reduction of the number of trainmen relative to the work to be done. 2. This reduction in the number of trainmen has increased the risk both to the trainmen and to the public and consequently the number of casualties in train service.

In his argument before the committee of the Kansas legislature, Mr. Roe specifically disclaimed that the efforts to obtain train-crew legislation were prompted by any desire to secure a reduction in the work performed by any trainman, or that if enacted it would result in any such reduction in their work. He based his argument entirely upon the ground of safety, stating that there are occasions when an additional man is needed to ensure the accurate and prompt transmission of signals between the conductor and the engineer, and that there are occasions when the protection of the rear of the train requires an additional man.

In the argument that an additional man is sometimes needed to transmit signals he instanced cases where in the absence of such a man there might be an accident, but did not cite any specific accident as having been due to this cause. His examples to show the need of another man to protect the rear of the train were no more concrete, and he admitted that there was no work for an additional man to do when the train was running between stations.

Number of Trainmen for Work Performed.

It is difficult to present any official statistics that will determine with absolute accuracy the relation of the number of trainmen to the work performed. It has already been noted that it is at present an almost universal practice to employ at least a conductor and two trainmen on through freight trains. It has also been indicated that it is the general custom to employ at least three brakemen on local freight trains, which are almost the only trains whose crews do switching en route. Even in this service, according to the contention of the railways, a third brakeman is employed to expedite business, and not because he is needed in the interest of safety. The fireman can, when necessary in emergency, flag the front of the train and the flagman the rear, leaving the conductor and forward brakeman to perform the switching.

In the case of through trains it is difficult for the railways to discover any duties for a third brakeman that could not be performed easily by other members of the crew. One duty frequently suggested, but not mentioned by Mr. Lee in his statement in the *Metropolitan Magazine*, is that a third brakeman is needed to ride on the top of the train. Except on mountain grades, where a third brakeman is provided, he is not needed on top of the train to manipulate the hand-brakes; and even although he might possibly at times be useful in that position to transmit signals to the engineer, it is the experience of operating officers that no discipline has yet been devised sufficiently severe to keep him there. It is an uncomfortable and dangerous position, and the brakeman naturally prefers the comfort and companionship of the caboose.

In this connection Mr. Lee voices the complaint that the longer trains and heavier equipment have increased the responsibility of trainmen in the inspection of the trains when stops are made at coaling and water stations. It has already been noted that the train crews no longer make the careful and detailed inspection of cars at the terminals before setting out upon their run. This work is now done by special employees at the terminals. But each train crew is required to keep a lookout en route for such

faulty conditions as hot boxes, broken couplers, broken brake-gear, and the like. The rules governing such observation of the train differ on different roads. But, in a general way, the requirement is that whenever trains stop at coaling and water stations the trainmen shall examine the train for the purpose of detecting any such defects. Sometimes, when the conditions are favorable, or when the occasion requires a more careful observation, the forward brakeman walks down one side of the train while the conductor or a rear brakeman walks up the other side until they are directly opposite to each other. They then cross over, and the rear brakeman inspects the other side to the rear of the train in going back to the caboose, while the forward brakeman looks over the other side to the front of the train in going back to the engine. But the ordinary conditions of train operation do not require such an examination. It is not necessary, except after a train has undergone some special strain, as when passing over a heavy grade, or making an uncommonly fast run, or when it is about to be placed under some such unusual stress. The customary practice is for the forward brakeman to watch the train as it pulls by, then to climb on the caboose and walk over the train to the engine, continuing the examination as he goes.

It is conceivable that additional men in the crew could reduce the time and labor required for the more careful examination first described, or could permit it to be made in a greater number of cases. But opportunities for such observation in the case of through trains are few because the stops are infrequent, and the number of men always on local trains is sufficient to make any needed examination. Therefore, the practical effect of a larger crew upon the number or the carefulness of these so-called "inspections" of trains on the road would be very small.

The following table, drawn from the annual statistical compilations of the Interstate Commerce Commission, is presented for the purpose of showing as accurately as possible for the years between 1901 and 1912 the relation of the increase in the number of trainmen to the increase in work performed. The term "trainmen" as here used includes enginemen, firemen, conductors, and all other operating men employed on trains; the term "other trainmen" as here used includes all trainmen except enginemen, firemen, and conductors. It is impracticable to separate men em-

ployed in passenger service from those employed in freight service; hence the train mileage shown is total train mileage, both passenger and freight, in revenue service. It is impossible to secure passenger-car mileage from the reports to the commission for 1901, and therefore it has been necessary to use the freight-car mileage alone. In view of the fact that the statistics are presented merely to show a tendency, the conclusions drawn are not disturbed by the slight degree of non-comparability.

	1901.	1912.	Increase.	Per cent of increase.
Total train-miles, revenue service.	908,092,818	1,236,758,715	328,665,897	36.19
Freight car-miles, revenue service.	12,832,092,209	19,466,402,067	6,634,309,858	51.70
Total number trainmen	209,043	318,329	109,286	52.28
"Other trainmen"	84,493	137,067	52,574	62.22

These statistics show that while train-miles have increased over 36 per cent between 1901 and 1912, and freight-car miles less than 52 per cent, the number of trainmen employed has increased over 52 per cent, and of "other trainmen," largely brakemen and flagmen, 62 per cent. It has already been noted that the number of trainmen in proportion to the tonnage handled has decreased. But, since the trainmen's work is with cars and trains, rather than with tons carried, car-miles and train-miles are a much better index of the amount of their work. On that basis, while the data given do not absolutely prove that the number of trainmen has increased more rapidly than the work to be performed by them, it would seem to be a fair conclusion that Mr. Lee's contention that railways have reduced the number of their trainmen relative to the work to be done is not sustained.

TRAIN-CREWS AND ACCIDENTS.

Accidents to Trainmen During the Year 1914.

In order to reach a conclusion as to whether accidents to trainmen have increased in recent years as a result of more economical methods of operation, it is desirable in the first place to analyze, so far as the statistics will permit, the causes of accidents to trainmen. In the first place, Mr. Lee's statement that the Brotherhood of Trainmen paid one claim for each 67 members in 1912 is apt to be misleading. It implies that this proportion of claims was due to accidental causes; but a check of this statement based on all available data shows that of the claims paid in 1912 no less than 48 per cent were ascribed to natural causes and only 52 per cent to accidental causes. Based on the average membership for the year, the claims paid that were due to accidental causes thus numbered only one for each 129 members.

In Connection with Train Operation.

Turning to the official statistics of the Interstate Commerce Commission, the following table, compiled by the accident division, shows the casualties to trainmen classified according to the causes, as reported by the railways in their monthly returns to the commission. These statistics are for the fiscal year ending June 30, 1914. They are divided into two parts—those relating to casualties in connection with train operation, but not resulting from accidents to trains, and the other covering casualties directly due to train accidents.

TABLE I.

CAUSES OF ACCIDENTS TO TRAINMEN DURING FISCAL YEAR 1914.

	Trainmen.		Trainmen in yards.		Yard trainmen.		Total.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
I.								
<i>Casualties in connection with train operation, but not in train accidents.</i>								
Being struck or run over by engine or car at stations or yards....	43	90	69	189	112	347	224	626
Being struck or run over by engine or car at other places	71	68	...	...	5	3	76	71
Falling from cars or engines	156	2,023	54	1,206	130	2,520	340	5,749
Coupling or uncoupling.....	46	665	45	457	72	1,516	163	2,638
Getting on or off cars or engines	30	2,994	15	1,653	31	3,282	76	7,929
While doing other work about trains (not in shops or engine-houses) or while attending switches	41	12,077	24	4,465	42	6,645	107	23,187
Coming in contact while riding on cars with overhead bridges, tunnels, or any fixed structure above or at side of track.....	51	605	12	276	18	562	81	1,443
Other accidents on or around trains not here mentioned	..	5	...	2	...	8	...	15
Accidents to railway or bridges not causing derailments, such as fires, floods, landslides, explosions, etc.	...	...	...	...	...	1	...	1
Being struck or run over by engine or car at highway grade crossings.....	...	...	...	...	...	...	...	...
Other causes	4	33	2	25	1	32	...	90
Total	442	18,560	221	8,273	411	14,916	1,074	41,749
II.								
<i>Casualties in train accidents.</i>								
Collisions.....	128	1,031	29	445	46	435	203	1,911
Derailments.....	159	1,221	9	107	20	213	188	1,541
Bursting of, or defects in, locomotive boilers or boiler attachments	8	380	1	97	...	125	9	602
Accidents to trains, cars, or engines, except collisions, derailment, and boiler explosions.....	1	89	...	12	2	14	3	115
Total	296	2,721	39	661	68	787	403	4,169
Grand total	738	21,281	260	8,934	479	15,703	1,477	45,918

It will be seen that a large proportion of the accidents to trainmen were due to their being struck or run over by engine or car, falling from cars or engines, coming in contact with overhead or lateral obstructions, or that they occurred while trainmen were getting on or off cars or engines. Of the total casualties in 1914, 54.0 per cent of those that were fatal and 34.4 per cent of those entailing injury were so caused.

While it is conceivable that an indirect connection might be shown between some of these accidents and a supposedly insufficient number of employees on the train, such a connection seems remote and cannot be established by any existing information. It does not seem clear that an increase in the number of employees would tend to reduce such accidents as these. Rather might it be assumed that an increase in the number of trainmen would tend to increase the number of such accidents. For example, if a third brakeman on freight trains were required to ride on the top of the train, it is fair to assume that there would be an increase in the number of brakemen killed and injured by falling from cars or coming in contact with lateral or overhead obstructions. An increase in the number of trainmen would not, of course, reduce the casualties resulting from fires, floods, landslides, or explosions.

This conclusion seems to be well supported: An analysis of the causes of accidents to trainmen from general causes in connection with train operation indicates little or no possibility that larger crews would reduce the risk of accident to trainmen.

In Connection with Train Accidents.

Turning to train accidents proper, the important causes are collisions and derailments. The Interstate Commerce Commission makes the following classification of the causes of derailments occurring in 1914:

	Number
Derailments due to defects in roadway, etc.....	1,888
Derailments due to defects of equipment.....	4,186
Derailments due to negligence of trainmen, signal men, etc.....	426
Derailments due to unforeseen obstructions of track, etc.....	318
Derailments due to malicious obstruction of track.....	58
Derailments due to miscellaneous causes.....	1,680
Total.....	8,565

Out of the 8,565 derailments reported, only 426, the number attributed to "negligence of trainmen, signal men, etc.," can be specifically connected with the train crews. The language used by the commission does not imply that any of these derailments could be attributed to too few men in train crews. It rather implies that they were due to the "negligence" of those who were so employed. It is of course conceivable that defects in equipment might have been noted and derailments avoided had the crew been larger; but this is an assumption which cannot be sustained by any evidence that has been found.

As to collisions, the Interstate Commerce Commission said in its annual report for 1912:

"The most disquieting and perplexing feature in the problem of accident prevention is the large proportion of train accidents caused by dereliction of duty by the employees involved. By far the greatest number of our serious train accidents are due to the failure of some responsible employee to perform an essential duty at a critical time. The seriousness of this problem is indicated by the fact that of the 81 accidents investigated up to September first, 52, or more than 63 per cent of the whole number, were caused by mistakes on the part of employees. These 52 accidents comprise 48 of the 49 collisions investigated and 4 of the 31 derailments. They caused the death of 248 persons and the injury of 1,309 persons. Of the 48 collisions caused by errors of employees, 33 occurred on roads operated under the train-order system and 15 occurred under the block system. The most numerous failures were by trainmen or enginemen. These were disobedience of orders; disobedience of signals; failure to keep clear of superior trains; improper flagging; and failure to control speed at dangerous points. Such lapses were responsible for 41 of the accidents investigated."

There is no indication in this statement that the commission believed that the collisions or other accidents investigated were due to an insufficient number of train employees, yet in all fairness it must be noted that the statement of causes is not sufficiently complete or thorough to permit the positive statement that none of these accidents would have been avoided had the train crews been larger.

Accidents to Trainmen from 1901 to 1914.

In connection with Mr. Lee's assertion that casualties to trainmen are in part due to the insufficient size of the train crew, and his implication that casualties are increasing, it is of interest to examine the statistics of casualties to trainmen from 1901 to 1914, classified by their causes, here shown in Table II. These statistics compiled by the Interstate Commerce Commission are not wholly comparable, as certain changes have been made in the classification of accidents during the period. Moreover, the statistics from 1901 to 1910 are taken from the annual reports of the railways to the commission, while those for 1911 to 1914 are from the summary of the monthly reports of accidents, annual reports of accidents having been abandoned in 1910. Because of the fact that for the last four years here presented the reports are made by the railways to the commission monthly instead of annually, and because the inspection of accidents has been more rigorous, the statistics for these last four years have doubtless been more complete; this will probably account, in considerable part, for the striking increases in the number injured. The fact that the larger number of casualties to trainmen are due to causes which have little, if any, relation to the number of men employed has already been discussed. This table simply emphasizes the fact by showing the same situation for 14 successive years. It should be noted, further, that while the number of injuries considerably increased from 1901 to 1904, they then did not vary greatly year by year until 1911, when they again appear to increase (due in part, as already noted, to more complete reports). The number of deaths, taking the period as a whole, was about the same for each year.

TABLE II.

CASUALTIES TO TRAINMEN, 1901-1914.

Year.	Collisions and derailments.		Coupling and uncoupling.		Falling from and jumping on or off trains, locomotives and cars.		Struck by trains, locomotives or cars.		Overhead obstructions.		All other causes.		Total.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
1901	464	2,508	163	2,377	441	5,130	255	574	48	457	166	5,669	1,537	16,715
1902	534	3,350	141	2,475	449	6,502	256	739	78	664	216	7,773	1,674	21,503
1903	648	4,526	211	3,023	541	7,324	367	824	82	656	221	9,323	2,070	25,676
1904	613	4,337	269	3,506	573	8,683	357	920	75	840	227	10,989	2,114	29,275
1905	579	4,736	217	3,316	526	8,443	365	866	59	839	244	11,653	1,990	29,853
1906	693	5,245	266	3,590	584	10,024	428	931	82	1,042	257	14,157	2,310	34,989
1907	776	6,273	272	4,062	644	11,394	475	1,171	91	1,017	279	16,838	2,537	40,755
1908 ¹	480	4,759	198	3,116	516	10,280	358	902	72	914	218	15,850	1,842	35,821
1909 ¹	389	3,159	137	2,271	379	8,568	243	577	47	775	149	13,768	1,344	29,118
1910 ¹	500	4,296	174	2,826	442	10,407	363	924	55	875	189	16,513	1,723	35,841
1911 ²	480	4,241	198	2,898	451	11,902	302	682	71	1,454	206	19,831	1,708	41,008 ²
1912 ²	468	4,695	185	3,164	465	12,849	305	713	69	1,472	171	21,082	1,663	43,975 ²
1913 ²	446	4,813	184	3,293	463	14,916	329	800	80	1,781	198	25,390	1,700	50,993 ²
1914 ²	391	3,452	163	2,638	416	13,678	300	697	81	1,443	126	24,010	1,477	45,918 ²

¹ Does not include accidents reported by switching and terminal companies.² Data for these last four years are more exact and more complete than for previous years. This fact alone would cause an apparent increase in the number of casualties. It will be noted that from the year 1904 to 1910 the number of casualties fluctuates about a fairly constant level. As pointed out in the text, the large number of the casualties to trainmen are due to causes which have little or no connection with the number of trainmen employed.

During the twelve years, 1902-1914, the Interstate Commerce Commission investigated directly through its own agents 1,570 train accidents, which were responsible for the death of 3,897 persons, or about one-third of the total number killed in such accidents during this period, and the injury of 22,932 persons, or over one-eighth of the total number injured in such accidents during this period.

The following tabulation shows the causes to which the commission attributed these 1,570 train accidents:

CAUSES OF PRINCIPAL TRAIN ACCIDENTS ON RAILWAYS OF UNITED STATES,
FISCAL YEARS 1902 TO 1914, INCLUSIVE.

	Number.
Fault of train crew other than brakemen:	
Disobedience of rules or orders.....	82
Misread orders.....	70
Excessive speed.....	150
Carelessness	112
Failure to heed signal.....	78
Ran past meeting point.....	38
Forgetfulness	49
Asleep	40
Failure to follow schedule.....	25
Intoxication	5
Other errors.....	1
Total.....	650
Fault of brakemen:	
Failure to flag.....	73
Improper flagging.....	39
Failure to set brakes.....	40
Other errors.....	6
Total.....	158
Fault of dispatchers, operators, etc.:	
Wrong orders.....	91
Failure to deliver orders.....	72
Switch misplaced.....	64
Wrong signal.....	62
Other errors.....	4
Total.....	293
Fault of other employees.....	19
Mechanical defects:	
Defective or weakened track.....	81
Defective or weakened equipment.....	103
Failure of air-brakes.....	30
Failure of block signals.....	4
Total.....	218

Hostile weather conditions.....	69
Malicious interference with track or equipment.....	41
Parting of trains.....	11
Miscellaneous causes.....	37
Causes uncertain or unknown.....	74
Total.....	1,570

Again, it may be said that, while the commission attributes none of these accidents to an insufficient number of men, yet it is clear that the commission does not follow the causes to their ultimate source, and hence it cannot be claimed that these statistics alone demonstrate that none of these accidents were due to an insufficient train force.

Accidents to Long Freight Trains.

The argument that more than two brakemen should be employed on long through trains in the interest of safety implies that these trains are more liable to accidents than short local trains with three brakemen, and that the third brakeman should be employed on through trains to reduce this liability. In this connection may be quoted statistics compiled by C. W. Kouns, general manager of the Atchison, Topeka & Santa Fe Railway's eastern lines, presented to the Joint Railroad Committee of the House and Senate of the Kansas Legislature last winter. Mr. Kouns said:

"For the purpose of aiding an understanding, these reports have been divided to show the number of accidents occurring to trains having more or less than 25 cars.

"The Missouri, Kansas & Texas report, covering three divisions, shows 2,718 trains run. Of this number, there were 79 accidents to trains carrying more than 25 cars and 119 to trains carrying less than 25 cars. In other words, under the first item there was one accident to every 345 trains, while the second shows one accident to every 179 trains.

"On the Union Pacific, in Kansas, during January, 1913, there were five accidents; all to trains having less than 25 cars. There were 873 such trains, so that the rate was one for each 175 trains run. They ran during the same period 644 trains with over 25 cars without accident.

"On the Atchison, Topeka & Santa Fe, from August, 1912, to January 31, 1913, there were 19,407 trains run with 25 cars or

less. There were 128 accidents to these trains, or one to every 152 trains run. There were 22,348 trains run with more than 25 cars. There were 123 accidents to these trains, or one to each 182 trains run.

"A significant fact in connection with these accidents is, that while a large per cent of the smaller trains were equipped with an additional man, 61 of the 128 accidents were due to errors of employees. On the heavier trains, and greater total number run, there were but 44 due to that cause.

"The Chicago, Rock Island & Pacific, reporting for six months ending December 31, 1912, shows 56 accidents to trains having less than 25 cars, or one for each 103 trains run, and 88 accidents to trains having more than 25 cars, or one for each 122 trains run.

"They also show a much larger number of accidents due to errors of employees on the smaller trains than the large ones; the figures being 54 on the smaller and 17 on the larger trains."

While the available evidence is not finally destructive of the claim that a number of the accidents in train service is due to the employment of too few men, yet the presumption from all the evidence is so strongly to the contrary that it throws the burden of proof upon those who make the statement. Thus far they have presented no specific evidence in support of their contention.

On the other hand, it is the unanimous opinion of railway operating officers that an increase in the number of men normally employed on trains will tend to increase the number of accidents not only to individual employees, but to the trains themselves. It will either result in a dangerous division of responsibility or else in an idle and unnecessary man becoming a hindrance to other employees in the performance of their duties. Replies received in 1909 by the Special Committee on Relations of Railway Legislation to Operation from railways operating in states where train-crew legislation had been passed were unanimous in expressing the view that no duties were performed by the extra man on a train that could not be performed by the other employees. It was, moreover, the unanimous opinion that the legislation did not and would not increase safety, while many expressed the opinion that it was bound to have the opposite effect.

Accidents to all Persons.

Larger train crews are urged, not only in behalf of the safety of trainmen, but also for the further reason that they would increase the safety of the traveling public and of railway employees other than trainmen. With respect to that claim, an analysis of the causes of accidents to railway employees, passengers, trespassers, and other persons in 1914 is shown in Table III. It will be seen that more than half of the casualties to passengers are due to collisions and derailments, which have been considered. As to the other casualties, there is no indication that the size of the train crew was a factor in their cause.

TABLE III.

CAUSES OF ACCIDENTS TO ALL PERSONS SUSTAINED IN CONNECTION WITH TRAINS, FISCAL YEAR 1914.

	Employees on duty.		Employees not on duty.		Passengers.		Trespassers.		Other persons not trespassing.		Total.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
I.												
<i>Casualties in connection with train operation, but not in train accidents.</i>												
Being struck or run over by engine or car at stations or yards.....	661	1,482	130	125	41	133	1,238	1,245	106	291	2,176	3,276
Being struck or run over by engine or car at other places	471	432	113	59	6	2	2,796	1,351	78	98	3,464	1,942
Falling from cars or engines.....	384	6,065	16	44	48	317	438	621	12	94	898	7,141
Coupling or uncoupling.....	171	2,692	.....	2	.....	.....	.....	.....	.....	.....	171	2,694
Getting on or off cars or engines.....	113	8,498	38	36	69	2,788	590	1,990	9	140	819	13,742
While doing other work about trains (not in shops or engine-houses) or while attending switches	107	23,265	.....	.....	.....	.....	.....	.....	.....	.....	107	23,265
Coming in contact while riding on cars with overhead bridges, tunnels, or any fixed structure above or at side of track.....	89	1,490	3	5	5	29	46	100	1	2	144	1,626
Other accidents on or around trains not here mentioned	52	1,884	2	204	7	4,103	47	426	17	837	125	7,454
Accidents to railways or bridges not causing derailments, such as fires, floods, landslides, explosions, etc. ....	.....	10	.....	.....	.....	.....	3	.....	.....	2	3	12
Being struck or run over by engine or car at highway grade crossings.....	.....	.....	11	15	.....	.....	122	119	1,014	2,801	1,147	2,935
Other causes.....	23	200	9	200	4	748	116	324	61	1,562	213	3,034
Total.....	2,071	46,018	322	980	180	8,120	5,396	6,176	1,298	5,827	9,267	67,121
II.												
<i>Casualties in train accidents.</i>												
Collisions	224	2,250	2	74	38	3,426	16	39	7	87	287	5,876
Derailments	211	1,820	3	38	46	3,512	56	135	2	56	318	5,561
Bursting of, or defects in, locomotive boilers or boiler attachments.....	11	630	.....	4	.....	.....	1	.....	.....	1	12	635
Accidents to trains, cars, or engines, except collisions, derailments, and boiler explosions	6	123	.....	1	1	63	2	4	.....	4	9	195
Total.....	452	4,823	5	117	85	7,001	75	178	9	148	626	12,267
Grand total.....	2,523	50,841	327	1,097	265	15,121	5,471	6,354	1,307	5,975	9,893	79,388

Train-crew Legislation as Affecting the Provision of Safety Appliances.

There is another side to this question of the effect of full train-crew laws on safety. If it be admitted that train-crew legislation is unnecessary, it must then be granted that such legislation not only will not promote safety, but may by reason of its expense be an actual obstruction in the way of the development of greater safety of the railways of the country. The Interstate Commerce Commission has frequently called attention to the need for physical improvements. In its annual report for 1912 it directed attention to conditions of track and equipment that lead to derailments, and recommended the universal installation of the block system as a means of reducing collisions. The improvement of track and equipment and the installation of block-signal systems and other physical improvements can be made only by the investment of a large amount of capital. As has been shown, the railways estimate that train-crew legislation applying throughout the country would increase railway expenses to the extent of from \$13,000,000 to \$20,000,000 per year. The former amount is the annual interest at 5 per cent on \$260,000,000; the latter on \$400,000,000. It has been estimated by the Special Committee on Relations of Railway Operation to Legislation that for \$260,000,000 block-signal systems could be installed on all railway mileage of the United States not now so equipped—in other words, train-crew legislation would cost the railroads at least as much as the universal installation of the block-signal system.

Railway officers contend that net earnings are insufficient even now to enable them to make these needed physical improvements. On this point the Block Signal and Train Control Board created by Congress to investigate appliances for the promotion of safety of railroad operation, in its final report to the Interstate Commerce Commission, on June 29, 1912, said:

“In discussing this subject it may be assumed at the outset that railroad officers and employees are as anxious to do everything in their power to promote safety as the public is to have safeguards provided, and that railroad officials and employees are not immune to the horrors of a terrible wreck. If all think alike and have the same desire, why are not better safeguards provided? The general answer for most railroads is the expense involved. Money is not available with which to provide and install the apparatus; it is needed elsewhere.”

STATE ACTION ON TRAIN-CREW LEGISLATION.

Repeal of Missouri's Train-crew Law by Referendum.

One of the most interesting and significant events that has occurred in the course of the struggle for and against train-crew legislation was the overwhelming defeat of the Missouri train-crew law by a referendum vote of the people at the general election in November, 1914.

The legislature passed the train-crew law in January, 1913. It required an extra man on all freight trains having more than 40 cars. The railways speedily decided to appeal from the legislature to the voters themselves. A petition was, therefore, circulated, and the necessary signatures being secured, the law was submitted to the people on the referendum ballot. The Brotherhood of Railroad Trainmen had secured the passage of the law, and it now spared no effort to prevent its being nullified by the people. The railways also carried on an energetic campaign. The official returns disclosed the remarkable fact that the law was defeated by more than two to one, the vote for it being 159,593, and the vote against it, 324,085. A majority against it was returned in no less than 102 out of the 116 counties in the State; and even in St. Louis, which the Brotherhood confidently expected to carry, it was beaten by a majority of 18,417. This is the only case where the question of train-crew legislation has been fully and squarely presented to the people themselves.

Connecticut Commission's Condemnation of Train-crew Regulation.

An attempt was made to secure the passage of a train-crew law in Connecticut in 1913. The legislature referred the matter to the Public Utilities Commission, with instructions to make a full investigation. The commission rendered a report on November 26, 1914, in which it condemned arbitrary requirements concerning the number of men that should be employed in train crews, and said it had been unable to find a single case where the

failure of a railway to employ enough men on a train had caused an accident. The commission said in part in its report:

“The facts brought out in the present investigation disclosed no instances of the jeopardizing of the safety of either the public or employees which increased train crews would prevent. It is the belief of this commission that, of all the railroad accidents attended by fatalities which have been reported to and investigated by it, not one has been attributable to an insufficiency in number of the train crew involved.

“It is not always practical in any line of business of considerable magnitude to maintain a sufficient force over and above that required for the regular and ordinary business, to meet the possible requirements of unexpected emergencies and conditions. At such times there devolves upon all loyal and faithful employes, as well as upon the employer, a moral duty and obligation to perform in addition whatever service is reasonably possible to save human life and to protect property.

“Any added or financial burden imposed upon the railroads under Federal or State control, both as to rates and operations, must ultimately and necessarily be borne by the patrons of such company, and the interests of such patrons, as well as the interest of the railroad and its employees, should be taken into consideration.”

TRAIN-CREW LEGISLATION VETOED BY GOVERNORS.

In conclusion, there are appended messages accompanying vetoes of train-crew bills by Governor Cruce of Oklahoma, in 1913, and Governor Hughes of New York, 1907; and extracts from veto messages of Governor Dix of New York, 1911, and Governor Foss of Massachusetts, 1912.

Governor Cruce's Veto Message—1913.

"I have studied this bill from every angle, and the more I have studied it the more I have become convinced that it should not receive my approval. In the enactment of this bill it is only the railway companies and their employees that have been considered. The thousands of people in this State who travel upon the railroads and ship their products and merchandise over same have not entered into the discussion. This fact, however, must remain after all has been said, that every dollar of expense placed upon railway corporations in Oklahoma will ultimately be paid by those who patronize the railroads. The cost of putting this bill into operation is estimated by the corporation commission at something like \$250,000, while the cost is estimated by the railroad companies at more than \$400,000. But whether it be \$100,000 or \$500,000, that amount in the end will be paid by those who use the railroads. Another thing I have learned to believe is that those who have made a lifetime study of railroad operations are better judges of the proper method of operating them than I am, and I believe that this is equally true when applied to a majority of the members of any legislative body. The trouble in Oklahoma is and has ever been that in dealing with public-service corporations we have assumed to know more about how properly to operate them than those who have given the matter careful study. Public-service corporations need to be regulated and need to be controlled. Oklahoma has undertaken to do this by the creation of a corporation commission, and has clothed that commission with unusual authority in dealing with such matters. That commission, after having studied this question, is better able to place suitable regulations upon the railroads than is the governor or the legislature.

"The practical effect of this bill would be to give employment to a number of railroad men without increasing the efficiency of the service, and would be supplying positions for three men to do the work that can be done by two. It is in entire harmony with the principle that has prevailed in this State of creating an army of officials to do the work that ought to be done by half that number of men. This legislature has set itself to the task of reducing the number of officials drawing salaries from the State, and a Herculean task it is proving. It is certainly inconsistent, while trying to curtail the number of useless public officials, to increase the number of appointed employees, who in the end must draw their subsistence from the same source that is now drawn upon by these useless public employees."

Governor Hughes' Veto Measure—1907.

"I return herewith, without my approval, Assembly Bill No. 455 (Senate Reprint No. 1338), entitled 'An act to better protect the lives of railroad employees.'

"This bill provides that it shall be unlawful for any railroad company in the State of New York 'that runs more than four freight trains in twenty-four hours' to run over any part of its road outside of yard limits any freight train composed of more than twenty cars with less than a full crew of six persons, to-wit: one engineer, one fireman, one conductor, and three brakemen; or a light engine without cars, without a crew composed of one engineer, one fireman, one conductor or flagman, when running a distance of ten miles or more from starting point.

"According to present practice, freight trains are very generally operated with a crew of five persons, and the object of this bill is to compel the employment of an additional brakeman. The necessity for this is said to lie in the fact that without three brakemen the freight trains are insufficiently manned, and that firemen are compelled to leave their places in all kinds of weather to throw switches when the two brakemen are required respectively to go ahead of and behind the train.

"This bill, however, upon the facts developed before me upon the hearing and undisputed, is clearly unconstitutional. Such a measure should define the service required, with suitable refer-

ence to circumstances and conditions, so that the law would apply in proper cases and not otherwise. The bill takes no account of the difference between the different roads and parts of roads, in trackage and switching facilities, and of the fact that what may be necessary in the case of some railroads may be wholly unnecessary in others. In the case of the New York Central Railroad it was shown that the trackage and switching facilities on its main line were of such a character as to make unnecessary the employment of a third brakeman in accordance with the provisions of the bill. This was frankly conceded by supporters of the bill.

"To require the expenditure of a very large amount of money (estimated at several hundred thousand dollars annually) without necessity for the outlay is simply arbitrary exaction and a taking of property without due process of law. The bill does not refer its requirements to any proper standard of necessity or provide any criterion by which its proper application, under varying conditions, is to be determined. It contains an absolute requirement which, upon the facts conceded before me, cannot be justified."

Governor Dix's Veto Message—1911.

"This bill is objectionable for the reason that it takes away from the Public Service Commission a right which it now has for the proper regulation of railroads."

Governor Foss's Veto Measure—1912.

Governor Foss vetoed a train-crew bill passed by the Massachusetts Legislature in 1912 on the ground that the public interest in such matters of detail in railway operation cannot be well protected by means of special arbitrary legislative enactments, but should be entrusted to an expert regulative commission. He said:

"I cannot pass judgment upon the question as to whether or not all freight trains of thirty cars should carry crews of six men, and all trains of twenty-nine cars five men. These matters can, in my judgment, be determined only by a permanent and powerful commission of experts skilled in railroad operation and regulation."

BULLETINS OF THE BUREAU OF RAILWAY ECONOMICS MISCELLANEOUS PUBLICATIONS

(Continued from page 2 of cover.)

Consecutive Number.	Miscellaneous Series Number.	
4.	1.	A Comparative Statement of Physical Valuation and Capitalization.
6.	2.	Railway Traffic Statistics, 1900-1909 (Superseded by Consecutive No. 31).
11.	3.	(Out of Print.)
15.	4.	(Out of Print.)
17.	5.	(Out of Print.)
18.	6.	(Out of Print.)
21.	7.	(Out of Print.)
23.	8.	(Out of Print.)
24.	9.	(Out of Print.)
28.	10.	Effect of Recent Wage Advances upon Railway Employees' Compensation during the Year Ending June 30, 1911. Variations in the Number of Railway Employees, 1909-1910-1911. Relation of the Number of Employees and their Compensation to Traffic and Revenue, 1909-1910-1911.
31.	11.	Railway Traffic Statistics, 1900-1910 (Superseded by Consecutive No. 66).
34.	12.	A Comparative Study of Railway Wages and the Cost of Living in the United States, the United Kingdom, and the Principal Countries of Continental Europe.
39.	13.	Comparison of Capital Values—Agriculture, Manufactures, and the Railways.
45.	14.	(Out of Print.)
53.	15.	The Arguments For and Against Train-Crew Legislation (Superseded by Consecutive No. 73).
62.	16.	List of Publications Pertaining to Government Ownership.
66.	17.	Statistics of Railways, 1900-1912, United States (Superseded by Consecutive No. 75).
73.	18.	The Arguments For and Against Train-Crew Legislation (Supersedes Consecutive No. 53).
75.	19.	Statistics of Railways, 1903-1913, United States (Supersedes Consecutive No. 66).

